

NHDOT SPR2 PROGRAM

RESEARCH PROGRESS REPORT

INSTRUCTIONS:

Project Managers and/or research project investigators should complete a progress report at least every three months during the project duration. Reports are due the 5th of the month following the end of the quarter. Please provide a project update even if no work was done during this reporting period.

Project # 26962P		Report Period Year: 2018 <input type="checkbox"/> Q1 (Jan-Mar) <input checked="" type="checkbox"/> Q2 (Apr-Jun) <input type="checkbox"/> Q3 (Jul-Sep) <input type="checkbox"/> Q4 (Oct-Dec)	
Project Title: Reducing Cracking in New Bridge Curbs			
Project Investigator: Eshan Dave Phone: 603-862-5268		E-mail: eshan.dave@unh.edu	
Research Start Date: December 1, 2016	Research End Date: September 30, 2019	Project schedule status: <input checked="" type="checkbox"/> On schedule <input type="checkbox"/> Ahead of schedule <input type="checkbox"/> Behind schedule	

Brief Project Description: In recent years a number of newly constructed concrete curbs on NHDOT bridges have suffered from premature, early-age cracking. This project focuses on proposing necessary changes to the materials specifications as well as construction and maintenance practices to lower the propensity for early age cracking. The scope of the project involves developing a crack measurement system to quantify cracking in curbs, using the measurement system on a number of newly constructed curbs with different concrete mixes (varying cementitious material amounts, water amounts etc.), construction practices, and curing strategies. Analysis of results from field trials and development of recommendations will also be completed.

Progress this Quarter (include meetings, installations, equipment purchases, significant progress, etc.):

Over this quarter multiple investigations were made to recently constructed bridge sites. The site visits include one trip to Alexandria (174/146), one trip to Marlborough (90/127), three trips to Tamworth (095/162), and six trips to Grantham (140/69). The curbs in Grantham also had thermocouples placed in them in order to monitor concrete hydration and heat generation in the curb during curing. In addition to the site visits, a document discussing the current findings in Task 2 was completed (it is submitted concurrently with this report).

The site visit to Alexandria was the first trip to the site since the winter. The south curb, which did not show any signs of cracking in the fall, had one very small crack form near the end of the curb. The north curb had 11 more cracks since the last investigation. The new cracks were smaller sized cracks which resulted in the average crack intensity of the curb to go down.

The Marlborough bridge had only one curb replaced and on the last investigation had experienced no visible cracking. The curbs placed in Tamworth were of two different mix designs. Both curbs had not experienced any cracking at the last investigation. One curb in Grantham was completed in the middle of the quarter and was investigated multiple times. The second curb was placed at the end of the quarter and has yet to be investigated. The first curb has shown no signs of cracking. The Marlborough, Grantham, and Tamworth curbs are smaller curbs less than 30 feet.

The Task 2 report completed this quarter discusses the method used to gather data on cracking at bridge sites as well as various indices that have been developed to compare cracking performances of different curbs. The report also includes preliminary analysis of the data that has been collected over the previous months. This analysis discusses the metrics used to quantify the amount and severity of cracking. One early observation is the increase in the amount of cracking and the length of cracks as the overall curb length increases. Additionally, cracking at the end fifths of the curbs seems to be less than the rest of the curb. Other aspects are also being investigated but either have limited data or have not shown strong correlations to cracking.

Items needed from NHDOT (i.e., Concurrence, Sub-contract, Assignments, Samples, Testing, etc.):

Continued cooperation from NHDOT regarding construction dates and coordination of test variables is required in the following months. NHDOT will need to work with researchers on making arrangements to have the thermocouples inserted into the formwork before concrete is placed. Following curb placement, NHDOT will need to send batch slips and concrete strength data to UNH researchers.

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Anticipated research next 3 months:

The following key topics will be undertaken by the research team during next 3 months:

- (1) Investigations of the Grantham curbs.
- (2) Follow-up site visits to Alexandria, Tamworth, and Marlborough curbs.
- (3) Preparation for any bridge curbs to be placed in Q3 and Q4 of 2018.
- (4) Continued preliminary analysis of data from study curbs.
- (5) Meeting with the Technical Advisory Group on current findings and future plans.

Circumstances affecting project: Describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope, and budget, along with recommended solutions to those problems.

No challenges effecting the progress of the project have yet occurred. Providing another bridge has the curbs replaced over the next quarter the project will continue to remain on schedule.

Tasks (from Work Plan)	Planned % Complete	Actual % Complete
1. Review of Current Practices	100	100
2. Construction of Concrete Curbs	74	70 ¹
3. Survey of Concrete Curbs for Cracking Performance	41	50*
4. Analysis of Results and Recommendation Development	0	0

¹ * Actual percent completed was determined assuming a total of 5 bridges will be constructed during the study. The current bridges constructed include Alexandria, Tamworth, Marlborough, and Grantham. Marlborough is counted as only half a bridge since only one curb was replaced.